FIELD TASK - STATEMENT OF WORK #4

Fourth Quarter 2004 Ground Water Monitoring Event

EMD CHEMICALS INC.
CINCINNATI, OHIO

Project No. 100.58.15

EPA ID No. OHD 086 438 538

December 17, 2004

Prepared For

EMD CHEMICALS INC.
2909 Highland Avenue
Cincinnati, Ohio 45212

Prepared By

THE PAYNE FIRM, INC.
11231 Cornell Park Drive
Cincinnati, Ohio 45242
1-800-229-1443 Fax: 513-489-2533

DRAFT

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Angela L. Hurley
Project Field Coordinator

Kevin D. Kallini, P.G.
Project Manager

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STATEMENT OF WORK #4

The Payne Firm, Inc.
Environmental Consultants

11231 Cornell Park Drive
Cincinnati, Ohio 45242
513-489-2255 Fax: 513-489-2533

DATE: December 17, 2004

SUBJECT: Fourth Quarter 2004 Ground Water Monitoring Event

PROJECT NO.: 100.58.15

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1. OBJECTIVES

This Statement of Work (SOW) identifies the second task that will be undertaken as part of a September 23, 2004 RCRA Voluntary Corrective Action Agreement (Agreement) between EMD Chemicals Inc. located at 2909 Highland Avenue, Cincinnati, Ohio (Facility) and the United States Environmental Protection Agency (US EPA).

This SOW involves the quarterly monitoring of ground water and surface water. The main objective of the quarterly monitoring program is to collect the sufficient data needed to make the appropriate determinations required by the RCRA Ground Water Migration Under Control Environmental Indicator (CA 750), determine current conditions in ground water, and the evaluation of corrective measures including the existing ground water collection interim measures. This SOW was prepared following the project-specific Quality Assurance Project Plan (QAPP), Payne Firm SOPs, and US EPA guidance document "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers," (May, 2002).

2. MONITORING WELL NETWORK / SAMPLE LOCATIONS

Fifty-two monitoring wells are located at the Facility, and twenty-one monitoring wells are located south and east of the Facility along State Route 562 and Interstate 71. These well locations are shown on Figure 1. Facility monitoring wells will be sampled to verify that no contamination is migrating off the facility past the existing ground water collection interim measures. Off-Facility monitoring wells will be sampled to determine the degree of seasonal variation at the site and to verify previous VOC detections from past sampling events. For this quarterly sampling event, 18 Facility monitoring wells and 15 Off-Facility monitoring wells will be sampled. Therefore, a total of 33 monitoring wells will be sampled during this quarterly monitoring event. In addition, surface water samples will be collected at the West Ravine Outfall, the Duck Creek Box Culvert Inflow and Outflow, and the location named Sewer C in the 84" storm sewer. These wells and surface water sampling locations are listed in Table 1.

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3. GROUND WATER SAMPLING FREQUENCY

During the interim remedy period, ground water sampling will be conducted on a quarterly basis. The number of monitoring wells sampled during each quarterly monitoring event will be reevaluated during each monitoring event.

4. GROUND WATER SAMPLING METHODOLOGY

The field activities associated with ground water monitoring will follow the project-specific QAPP, site-specific Health and Safety Plan (H&S Plan), and the Payne Firm's Standard Operating Procedures (SOPs) for Well Purging (SOP 6-3), Ground Water Sampling (SOP 6-4), and Decontamination of Water Sampling Equipment (SOP 6-1). The Payne Firm's SOPs are consistent with the May 2002 US EPA guidance document "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers." The methodology will consist of the following primary elements:

- Prior to sampling a monitoring well, appropriate measurements such as the static water level, total well depth, volume of water in the well, and ground water elevation will be made.
- A submersible pump (QED Well Wizard® Bladder Pump) with dedicated Teflon tubing will be slowly lowered into the well to a point within the well screen interval.
- Each well will be purged following the low flow purging methods described in SOP 6-3. During well purging, water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential [ORP], dissolved oxygen, and turbidity) will be recorded from an in line flow-through cell every 3 to 5 minutes after a minimum of one tubing volume of water has been removed. Purging may cease when measurements for all parameters have stabilized for three consecutive measurements. Stabilization criteria for the water quality parameters is as follows (USEPA 2002):

    i. pH: +/- 0.1
    ii. specific conductance: +/- 3% S/cm
    iii. dissolved oxygen: +/- 0.3 milligrams per liter
    iv. oxidation-reduction potential: +/- 10 millivolts
    v. turbidity: +/- 10% (when turbidity is > 10 NTUs).

    The flow rate during purging will initially be low (0.2 to 0.5 liter per minute); the flow rate can be increased as long as the drawdown in the well does not exceed 0.33 feet.
- Different purging procedures may need to be followed when purging wells that are installed into low hydraulic conductivity aquifers or formations that are not able to yield at least three well volumes during purging. The purge withdraw rate should be as low as possible to minimize the drawdown in the well. If a well has an open interval across the water table in a low permeability zone, there may be no way to avoid pumping and/or bailing the well dry. In this case, the well should be sampled at some appropriate time period such that a sufficient volume of water is in the well for sampling purposes. Equipment such as a peristaltic pump or bailer may be used to purge monitoring wells that will not produce at least three well volumes.
- Stabilization is considered achieved when measurements are within approximately ten percent over two consecutive measurements. For low yielding wells (wells incapable of yielding three casing volumes) whose water level is located below the top of the well screen, the well will be purged to dryness once. As soon as the well recovers sufficiently, one sample will be taken for the measurement of ground water indicator parameters prior to sampling the well.
- Once sufficient water is purged, ground water will be transferred to laboratory supplied containers

for analysis of VOCs. Appropriate sample preservation will be added to the ground water samples, according to the particular analysis to be conducted (see Section 5).

- The ground water samples will be appropriately packaged and shipped under proper chain-of-custody procedures to the project laboratory, Severn Trent Laboratories, Inc. (STL) in North Canton, Ohio.
- Ground water sampling information will be recorded on a ground water sampling form and/or in the project field logbook.

5. SAMPLING CONTAINERS, IDENTIFICATION, ANALYSIS AND PRESERVATION

The water samples will be labeled as **MW008/[date]**, where:

MW008/[date], 008=Well identification;
MW008/[date], [date]=Date of sample collection.

Ground water and surface water samples will be collected into three 40-milliliter containers, and will be analyzed for VOCs by U.S. EPA Method SW-846 8260B (Appendix IX list plus total 1,2-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene). As presented in the project QAPP, a lowered detection limit for 1,4-Dioxane (50 ug/L) has been communicated to the project laboratory for the duration of this project. Each sample container will be provided by the analytical laboratory, and will be preserved with hydrochloric acid for VOC samples. Each sample will be cooled to 4º Celsius after collection.

6. SAMPLE HANDLING AND SHIPMENT

All samples will be labeled immediately after collection. The information on the sample label will include the project name, sample identification, sample date and time, and the analyses requested. Samples will be packaged and shipped to the project laboratory.

7. FIELD DOCUMENTATION

7.1 Field Logbook

A field logbook and a field ground water sampling form will be used to record facts and circumstances of the sampling event. Information recorded in the logbook/field form will include the following:

- Name of sampling personnel;
- Sample location;
- Time and date;
- Weather conditions;
- Sample type (i.e. grab, composite, etc.); and
- Pertinent sample data.

7.2 Chain-of-Custody

Chain-of-custody documentation will accompany each sample shipment. The chain-of-custody record will record the project name, type of sample collected, date of sample collection, name(s) of the person(s) responsible for sample collection, date of custody transfer, signature of the person relinquishing and accepting sample custody, analytical procedures to be used, and other pertinent information.

8. EQUIPMENT DECONTAMINATION

If non-dedicated sampling equipment is used during this sampling event, the sampling equipment will be decontaminated prior to use at each monitoring well location. As presented in the site-specific H&S Plan, proper personal protective equipment (PPE) will be worn during the decontamination process with gloves disposed of in between decontamination of equipment used on each monitoring well. Decontamination procedures include:

- Disconnect internal pump parts, including Teflon bladder and pump fittings.
- Scrub the exterior of the pump and associated internal pump fittings and Teflon bladder in a non-phosphate detergent solution; (Bucket #1);
- Rinse with distilled water (Bucket #2);
- Allow to air dry.

Dedicated tubing will be used at each monitoring well location; therefore, it will not be necessary to decontaminate pump tubing between monitoring well sampling locations.

Decontamination solutions will be contained and new solutions used during each day of sampling, or more often if deemed necessary. All decontamination solutions will be contained and properly disposed.

9. QUALITY ASSURANCE

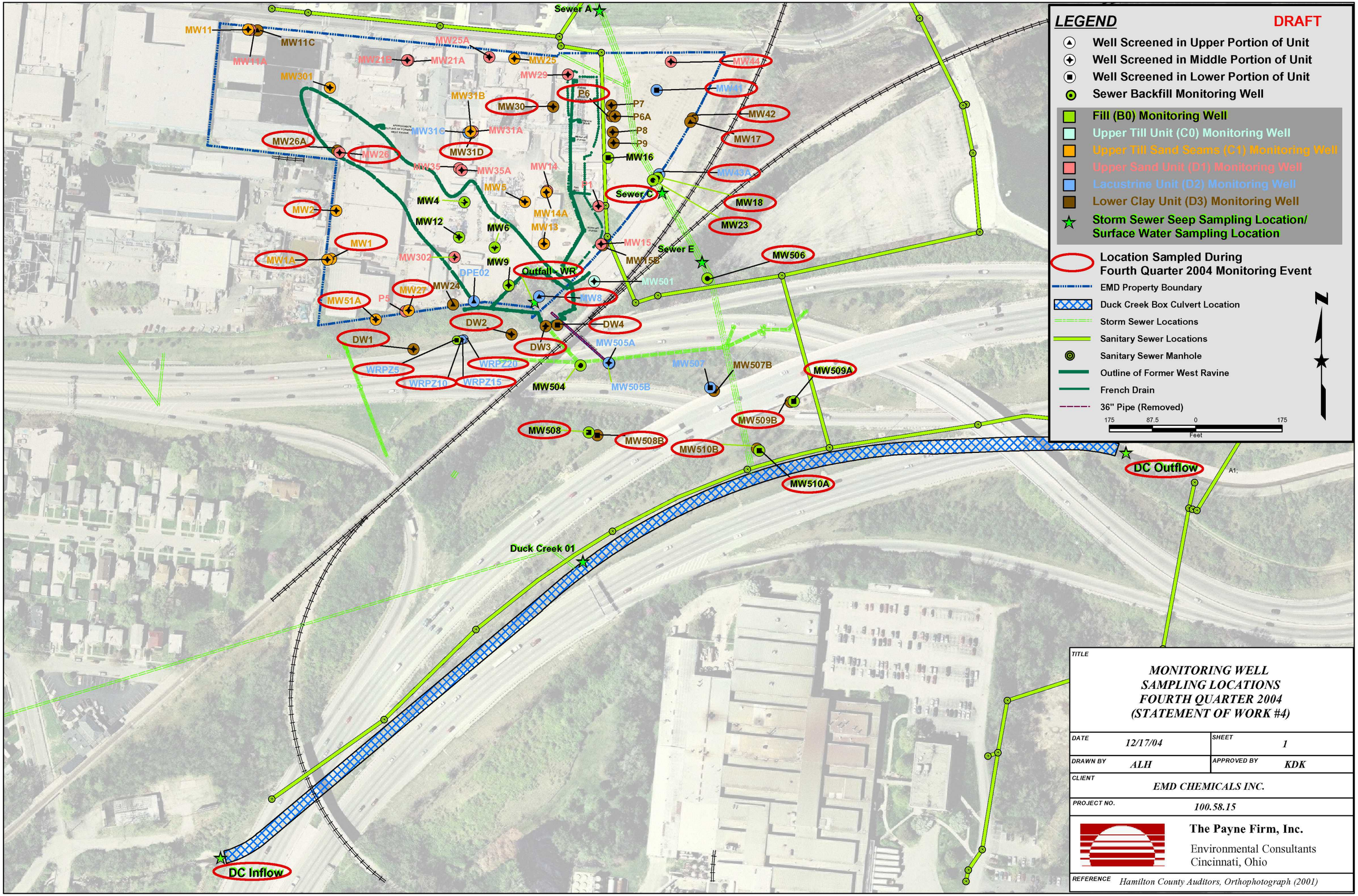
Sample collection, quality assurance/quality control procedures, and employment of data quality objectives will be conducted by the Payne Firm in accordance with the Payne Firm's SOPs and project-specific QAPP. During the monitoring event, the following QA/QC samples will be collected at a minimum:

- One trip blank sample will be shipped with each sample cooler containing samples for VOC analysis. Trip blanks are provided by the project laboratory and kept with the sampling containers throughout the day. The trip blank samples will be identified as: TB01/date. The trip blank sample will be analyzed for VOCs.
- Two duplicate samples will be collected. The duplicate samples will be collected from monitoring wells MW31D and MW508. The duplicate samples will be identified as: DUP01/date (for duplicate of MW31D) and DUP02/date (for duplicate of MW508), and will be analyzed for VOCs.
- Two matrix spike/matrix spike duplicate (MS/MSD) samples will be collected during the sampling event. MS/MSD samples will be collected at MW31D and MW508 and will be analyzed for VOCs. The lab will be provided triple the volume for each with MS/MSD indicated on the chain of custody.
- Two field blank samples will be collected during the sampling event by filling laboratory grade water directly into the appropriate sample containers and will be analyzed for VOCs. The laboratory grade water will be provided by the project laboratory. One field blank will be collected on the Facility, and one will be collected off of the Facility property. The field blank sample will be labeled as FB01/date for the sample collected on the Facility property, and FB02/date for the sample collected off of the Facility property.
- Equipment rinsate samples will be collected if non-dedicated submersible sample pumps are utilized. The rinsate samples will be collected after the ground water sampling pump has been properly decontaminated at the end of the day. The sample will be collected by pouring laboratory grade water over the sampling pump, and collecting the rinsate off of the pump into the appropriate sample containers. The laboratory grade water will be provided by the project laboratory. The rinsate samples will be labeled as RIN01/date and RIN02/date.

10. SAMPLING TEAM

Dan D. Weed, C.P.G. (Principal)
Kevin D. Kallini, P.G., Staff Geologist (Project Manager)
Angela L. Hurley, Staff Geologist (Project Field Coordinator)
Payne Firm field personnel (Field Sampling)

FIGURES



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TABLES

The Payne Firm, Inc.

EMD Chemicals Inc.
Cincinnati, Ohio
Project No. 100.58.15

Table 1: Fourth Quarter 2004 Monitoring Event Information

On-Property Monitoring Wells									
Well ID	**Total Depth**	**Sampling Hierarchy**	**Sample ID**	**Analytical Method**	**# of Sample Containers**	**Preservative**	**QA/QC Samples**	**QA/QC Sample ID**	**QA/QC Sample Analysis**
MW26A	60.47	1	MW026A/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW43A	53.26	2	MW043A/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW42	59.50	3	MW042/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW44	56.03	4	MW044/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW41	55.34	5	MW041/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW18	45.33	6	MW018/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW17	44.56	7	MW017/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
P6	54.00	8	P006/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW30	72.50	9	MW030/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW26	41.98	10	MW026/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW8	16.90	11	MW008/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW23	39.70	12	MW023/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW31D	61.90	13	MW031D/[date]	VOC-8260	3-40 ml vials	ice, HCl	Field Duplicate, MS/MSD	DUP01/[date], MW031D/[date]*	VOC-8260
MW1	21.00	14	MW001/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW1A	29.46	15	MW001A/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW2	21.70	16	MW002/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW27**	21.28	17	MW027/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW51A	22.21	18	MW051A/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
West Ravine Outfall	NA	NA	Outfall/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
Off-Property Monitoring Wells									
Well ID	**Total Depth**	**Sampling Hierarchy**	**Sample ID**	**Analytical Method**	**# of Sample Containers**	**Preservative**	**QA/QC Samples**	**QA/QC Sample ID**	**QA/QC Sample Analysis**
DW001	30.46	NA	DW001/[Date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
DW002	27.83	NA	DW002/[Date}	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
DW003	29.33	NA	DW003/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
DW004	42.44	NA	DW004/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW506	14.05	NA	MW506/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW508	36.50	NA	MW508/[date]	VOC-8260	3-40 ml vials	ice, HCl	Field Duplicate, MS/MSD	DUP02/[date], MW508/[date]*	VOC-8260
MW508B	50.00	NA	MW508B/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW509A	18.60	NA	MW509A/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW509B	26.39	NA	MW509B/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW510A	15.65	NA	MW510A/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
MW510B	29.12	NA	MW510B/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
WRPZ05	CHECK	NA	WRPZ05/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
WRPZ10	CHECK	NA	WRPZ10/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
WRPZ15	CHECK	NA	WRPZ15/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
WRPZ20	CHECK	NA	WRPZ20/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
Sewer C	NA	NA	SEEP C/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
Duck Creek Input	NA	NA	Inflow/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA
Duck Creek Output	NA	NA	Outflow/[date]	VOC-8260	3-40 ml vials	ice, HCl	NA	NA	NA

* = indicate MS/MSD under "Special Instructions/Conditions of Receipt" on chain of custody
**=purge water should be drummed pending analytical results

Other QA/QC Samples					
Sample Type			**Sample ID**	**Analysis**	**Comments**
Trip Blank			TB01/[date], TB02/[date], etc.	VOC-8260	Sent with every shipment of VOC samples
Field Blank			FB01/[date], FB02/[date]	VOC-8260	Total of 2 Field Blank Samples; one collected on property, one collected off property
Rinsate			RIN01/[date], RIN02/[date]	VOC-8260	Collect only if non-dedicated pumps are used.

EMD Chemicals Inc.
Norwood, Ohio
Project No. 0100.58.19

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TABLE 7: Sample Containers, Preservatives, and Holding Times

Analytical Parameters	Matrix	Minimum Sample Size[1]	RCRA (SW846)[2, 3]		
			Analytical Method	Sample Preparation Method	Requirements
VOCs	Water	40 mL	8260B	SW-846 5030B	40 mL glass, VOA vial (in triplicate) with Teflon®-lined septa without headspace, Cool, 4° C, Add sodium thiosulfate if residual chlorine, 1:1 HCl to pH £ 2, 14 days with pH £ 2
	Solid[4]	5 g or 25 g	8260B	SW-846 5035	4 or 8 oz glass with Teflon®-lined lid, Cool 4° C, 14 days. Field preserved with sodium bisulfate solution for low level analysis, or with methanol for medium level analysis. Soil sample can also be taken by using three EnCore™ samplers and preserved in the laboratory within 48 hours of sampling. Maximum holding time for Encore Sampler is 48 hours (before the sample is added to methanol or sodium bisulfate). Cool, 4° C[5]
SVOCS	Solid	50 g	SW-846 8270C	SW-846 3550B	4 oz. glass wide mouth with Teflon-lined lid, cool, 4° C, Extraction within 14 days of sample collection, and analysis within 40 days of extraction.
	Water	1000 ml	SW-846 8270C	SW-846 3520C	2X1 liter amber glass with Teflon-lined lid, cool to 4°C, extraction within 7 days of sample collection, and analysis within 40 days of extraction.
Metals[6]	Solid	50 g	SW846-6010B	SW846-3050B	4 oz. glass jar at 4°C, holding time 6 months after sample collection.
	Water	500 ml	SW846-6010B	SW846-3005A	500 mL plastic bottle preserved with HNO3 to pH<2, holding time 6 months after sample collection.
TOC	Solid				

1 = Minimum sample size indicates sample amount needed for a single analysis. Matrix spikes or duplicates will require an additional sample amount of at least this amount for each additional QC sample aliquot required.

2 = Holding times are calculated from the date of collection.

3 = Resource Conservation and Recovery Act, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition, September 1986. Contains Final Update I (July 1992), Final Update IIA (August 1993), Final Update II (September 1994), Final Update IIB (January 1995), and Final Update III (December 1996).

4 = Solid matrix type includes soil, sediment, sludge or other solids not classified as waste.

5 = Depending on regulatory programs, EnCore™ samplers may be preserved for up to 14 days from sampling by freezing at -5 to -12° C until analysis. Alternatively the EnCore™ sample may be transferred to a 40-ml VOA vial and preserved by freezing at -5 to -12° C until analysis. Some regulatory agencies may require 4 or 8 oz glass with Teflon®-lined lid, Cool 4° C, 14 days. This technique is not recommended, but will be supported where required. (Preservation and holding times are subject to client specifications.)

6 = Arsenic, chromium, and nickel.

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Norwood, Ohio
Project No. 0100.58.19

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TABLE 8: List of Field Standard Operating Procedures

Field Procedure	The Payne Firm SOP Number[1]
Field Log Books	1-1
Labeling and Custody	1-3
Packaging and Shipping	1-4
Hazard Recognition	1-5
Restoration of Work Site	1-7
Land or Elevation Survey	1-8
Water Level Measurements	2-5
Turbidity Measurements	2-7
Measurement of Specific Conductance and pH	2-9
Measurement of Temperature	2-10
Collection of an Air Sample	2-11
Use of Toxic Vapor Analyzers	2-14
Decontamination of Drilling Equipment	3-1
Observation of Hollow Stem Auger Drilling Activities	3-2
Borehole Logging	3-5
Borehole Abandonment	3-6
Observation of Rotasonic Drilling Activities	3-7
Installation of Monitoring Wells	4-2
Well Abandonment	4-4
Decontamination of Soil Sampling Equipment	5-1
Soil Sampling	5-2
Soil Headspace Organic (HSO) Field Screening	5-3
Decontamination of Water Sampling Equipment	6-1
Well Development	6-2
Well Purging	6-3
Ground Water Sampling	6-4
Field Filtration of Ground Water Samples	6-6
Project Management	8-1
Data Validation	8-2

[1] SOPs are located in Appendix II.

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TABLE 10: Summary of Analytical Methods

Parameter Group	Water	Solid	Sample Preparation Method	
			Water	Solid
Appendix IX Volatile Organic Compounds	SW-846 8260B	SW-846 8260B	SW-846 5030B	SW-846 5035
Appendix IX Semi-Volatile Organic Compounds (Modified)	SW-846 8270C	SW-846 8270C	SW-846 3520C	SW-846 3550B
Metals	SW-846 6010B	SW-846 6010B	SW-846 3005A	SW-846 3050B
Total Organic Carbon	NA	SW-846 9060	NA	NA
Geotechnical Engineering Properties				
Grain Size	NA	ASTM D422	NA	NA
Unit Weight, Porosity, Void Ratio, Degree of Saturation	NA	ACOE	NA	NA
Moisture Content	NA	ASTM D2216	NA	NA
Specific Gravity	NA	ASTM D854	NA	NA
Atterberg Limits	NA	ASTM D4318	NA	NA
Permeability (Undistributed)	NA	ASTM D5084	NA	NA
Permeability (Distributed)	NA	ASTM D2487	NA	NA
Unified Soil Classification System (USCS)	NA	ASTM D2434	NA	NA
Waste Characterization				
VOC TCLP	NA	SW-846 8260B	NA	SW-846 5035
SVOC TCLP	NA	SW-846 8220C	NA	SW-846 3550
Metals TCLP	NA	SW-846 6010B	NA	SW-846 3050B
Pesticides TCLP	NA	SW-846 8081A	NA	
Herbicides TCLP	NA	SW-846 8151A	NA	
Polychlorinated Biphenyls TCLP	NA	SW-846 8082	NA	
Corrosivity	NA	SW-846 9045C	NA	

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TABLE 10: Summary of Analytical Methods

Parameter Group	Water	Solid	Sample Preparation Method	
			Water	Solid
Ignitability	NA	SW-846 1010	NA	
Reactive Cyanide	NA	SW-846 7.3.3	NA	
Reactive Sulfide	NA	SW-846 7.3.4	NA	
Total % Solids	NA	MCAWW 160.3 MOP	NA	

NA = Not Applicable.
SW-846 = "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA SW-846, 3rd Edition
ASTM = American Society for Testing Materials
ACOC = "Laboratory Soil Testing," Army Corps of Engineers, EM 1110-2-1906, November 30, 1970.
MCAWW = Method for Chemical Analysis of Water and Waste